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RESEARCH ARTICLE

Redescription of *Ventania avellanedae* (Stylommatophora: Odontostomidae), a land snail endemic to the Ventania Mountain System, Argentina

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ABSTRACT. Although the presence of apertural folds and lamellae is the most recognizable character of the Odontostomidae, some species lack them, mostly in *Anctus* Martens, 1860, *Bahiensis* Jousseaume, 1877 and *Moricandia* Pilsbry & Vanatta, 1898. *Eudioptus avellanedae* Doering, 1881 – a slender odontostomid species that lacks even the slightest trace of folds or lamellae in its shell aperture – was however transferred to *Odontostomus* by Pilsbry in 1902 on the basis of its building forward of the aperture-margins. It is currently placed in its own monotypic subgenus, *Cyclodontina* (*Ventania*) Parodiz, 1940, on the basis of about the same argument. In this paper we redescribe its shell morphology and, for the first time, describe the internal anatomy of the pallial complex and the reproductive and digestive systems. The presence of a spongy gland in the pallial complex; of a short penis sheath with no retractor muscle; of a bursa copulatrix duct longer than spermoviduct, and of an epiphallic gland strongly support the inclusion of this unusual species in Odontostomidae. The species is diagnosable by the sculpture of the protoconch, which is not smooth as previously described, but has waved axial ribs crossed by spiral lines in young specimens; the distinctive external and internal shape of the bursa copulatrix duct; the internal penis wall divided in three regions of different sculpture; the smooth inner wall of the vagina; the long and cylindrical epiphallus with a distal widening indicating the presence of an epiphallic gland, and the penis retractor muscle inserted in the distal end of a short flagellum. These characters support the validity of *Ventania* Parodiz, 1940, different from *Cyclodontina* Beck, 1837.

KEY WORDS. Anatomy, conservation, endemisms, Gastropoda, Orthalicoidea.

INTRODUCTION

Ventania Parodiz, 1940 is a genus of terrestrial snails including a single species from the southern Buenos Aires province, Argentina. *Ventania avellanedae* (Doering, 1881) exclusively inhabits the orographic system of Ventania, of Paleozoic origin (Ventana and Curamalal Sierras). Although a specimen from Golfo Nuevo (northern Patagonia) was cited by Pilsbry (1902), the presence of this species outside the Ventania Mountain System was never confirmed by further collections.

Up to now, this snail was classified exclusively by its shell morphology. Originally described as a member of Bulimulidae, its slightly expanded aperture with a faintly reflected outer lip was the basis for Pilsbry (1902) to include this species in Odontostomidae. However, due to its slender aspect and lack of even the slightest trace of folds or lamellae in the shell aperture, its generic assignment was uncertain up to the establishment of the monotypic subgenus *Cyclodontina* (*Ventania*) by Parodiz, 1940, who also described the radula of this species. Nevertheless, radular features did not add any diagnostic character to further support that generic position.

This same species was described by Pilsbry (1896) from Sierra de la Ventana position as *Anctus* (?) stearnsianus. Soon after, Pilsbry (1902) acknowledged that this species was, in fact, a junior synonym of *Eudioptus avellanedae* Doering, 1881 (Bulimulidae) but he stated that there was an "absolute" (though not specified) difference with other species of *Eudioptus* Albers, 1860, and concluded that *E. avellanedae* was similar to some species

of *Odontostomus* (*Spixia*) Pilsbry & Vanatta, 1898, hypothesizing that it had totally lost the apertural folds and lamellae, as it seems to have partially occurred in *Plagiodontes patagonicus* (d'Orbigny, 1835), with which *E. avellanedae* concurs in the same habitat. Parodiz (1940) realized that *E. avellanedae* was not a *Spixia* and compared it with species in *Bahiensis* Jousseaume, 1877 (at that time, considered another section of *Odontostomus* Beck, 1837), in which some species have remnants of apertural dentition while others lack any fold in the aperture. Besides the apertural differences, a main argument to split the monotypic *Odontostomus* (*Ventania*) from *Bahiensis* and *Spixia* was the completely smooth protoconch of the former. Parodiz (1940) also stressed that *Ventania* has a fully convex outer surface on the last whorl because, having no folds occluding the aperture, there are no depressions behind the lip, which are characteristic of *Spixia* and other forms in *Odontostomus* Beck, 1837. According to Parodiz (1940) *Ventania* was part of *Odontostomus* because its radular structure was fully similar to that of some species in the group of *O.* (*Spixia*) *alvarezi* (d'Orbigny, 1835).

Parodiz (1944) modified the classificatory scheme by moving the subgenera *Spixia* Pilsbry & Vanatta, 1898, *Scalarinella* Dohrn, 1875, *Plagiodontes* Doering, 1876, *Ventania* Parodiz, 1940, *Bahiensis* Jousseaume, 1877 and *Moricandia* Pilsbry & Vanatta, 1898 from *Odontostomus* to *Cyclodontina* Beck, 1837. All of them were afterwards treated as full genera (Fernández 1973, Campos-Salgado and Santos-Coelho 2003, Scarabino 2003, Simone 2006, Cabrera and Martínez 2012), with the only exception of *Ventania*, since no author has discussed this taxonomic uncertainty on new characters. Two papers on conservation of land snails (Burela et al. 2003, Delhey et al. 2005) cited this species as *Ventania avellanedae*, with no mention to the taxonomic criterion to *Ventania* being raised to the genus level.

Some morphological features described in the literature do not fit well with the actual, fresh material (e.g., protoconch sculpture of young specimens, radular teeth morphology), and nothing is currently known on the soft anatomy of this snail species. Our new information leads to consider *Ventania* a different monotypic genus, different from *Cyclodontina*. We follow Breure et al. (2010) and Breure and Romero (2012) in considering Odontostomidae at the family level and Simone (2006) and Colley (2013) in considering *Bahiensis* and *Cyclodontina* as different genera.

MATERIAL AND METHODS

We studied shells and living snails collected in several sites of the Ventania Mountain System (Cerro Curamalal Chico, 37°41'S, 62°18'W, 10 specimens, Natalia Ghezzi leg., 1999; Cerro Curamalal Grande 37°43'S, 62°13'W, 5 specimens, Julia Pizá leg. 2014; Cerro Ventana, 38°09'S, 61°48'W, 12 specimens, Natalia Ghezzi and Julia Pizá leg. 1999; Sierra de la Ventana, 38°07'S, 61°47'W, 5 specimens, Julia Pizá leg. 2011). The analysis was complemented with shell specimens of the malacological collection at the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN, Buenos Aires): MACN 9487: Sierra de la Ventana, 6 shells, Hans Seckt leg., 1918. MACN 11270: Sierra de la Ventana, 1 shell, Martín Doello-Jurado leg., 1920. MACN 21263: Sierra de la Ventana, 3 shells, Horacio J. Harrington leg., 1923. MACN 23090: Sierra de la Ventana, 4 shells, Alberto Castellanos leg., 1937. MACN 1644: Sierra de la Ventana, 5 shells, Héctor S. Gavio leg., 1939. MACN 24395: Sierra de la Ventana, 1 shell, Oscar Kühneman leg., 1940. MACN 18596: Sierra de Curamalal, 2 shells, Augusto C. Scala leg., 1929. MACN 3228: Sierra de la Ventana, 1 shell, María de las Mercedes Richard leg., 1943. MACN 11085: Sierra de Curamalal, 2 shells, Lucas Kraglievich leg., 1920. MACN 34037: Cerro Ventana, 21 living specimens, Natalia Ghezzi and Julia Pizá leg., 1999.

Morphometric variables were obtained on scaled sketches made with a drawing device on a stereoscopic microscope (variables defined as Pizá and Cazzaniga 2003): shell length (SL), shell width (SW), last whorl length (LWL), aperture length (AL), aperture width (AW), major angle (MA) and spiral angle (SA). Total whorl number (WN) was determined by direct observation under a stereoscopic microscope. Measurements are quoted as: mean ± standard deviation (coefficient of variation) [minimum–maximum]. Cephalopodium data were measured with a scaled eyepiece: foot length, foot width, head length, length of the ocular tentacles, and length of the fore tentacles. Teleoconch and protoconch sculpture were studied with a LEO EVO 40-XVP scanning microscope, on shells of young and adult specimens.

Dissections were made on freshly dead specimens. Radulae and mandibles were obtained and prepared according to Ploeger and Breure (1977).

TAXONOMY

Orthalicoidea Albers, 1860
Odontostomidae Pilsbry & Vanatta, 1898

Ventania Parodiz, 1940

Cyclodontina (*Ventania*) Parodiz, 1940.

Type and only species. *Ventania avellanedae* (Doering, 1881).

Diagnosis. Shell elongate-ovate, rather thin, glossy, tawny to brown in color, whorls slightly convex, protoconch with axial ribs crossed by spiral lines, teleoconch with fine, irregular, radial wrinkles and wavy spiral striae; elongate-ovate aperture occupying ⅓ of the total shell length and lacking any fold or lamella; peristome slightly expanded and reflected. Short flagellum with the thin penis retractor muscle attached at its distal end. Epiphallus long and distally widened indicating the presence of an internal epiphallic gland. Penial papilla absent.

Ventania avellanedae (Doering, 1881)

Figs 1–20

Eudioptus avellanedae Doering, 1881: 64, pl. 1, figs 2, 3; Breure 1974: 112.
Anctus (?) *stearnsianus* Pilsbry, 1896: 41; Baker 1963: 230; Breure 1974:124.
Odontostomus (*Spixia*) *avellanedae*: Pilsbry 1902: 91, pl. 11, figs 56–59.
Odontostomus (*Ventania*) *avellanedae*: Parodiz 1940: 229, fig. 5; Parodiz 1942: 334, pl. 3, fig. 27; Richardson 1993: 44.
Cyclodontina (*Ventania*) *avellanedae*: Parodiz 1944: 5; Parodiz 1957: 28; Fernández and Castellanos 1973: 281; Fernández 1973: 121; Cuezzo et al. 2013.
[?] *Spixia avellanedae* [sic]: Breure 1974: 125.
Ventania avellanedae: Burela et al. 2003: 176, Delhey et al. 2005: 11.

Type locality. Doering stated that this snail inhabit on "rocas cuarcíticas de la Sierra de Currumalan" [Quartzite rocks in the Curamalal sierra], and also in "cerros o promontorios de la Sierra de la Ventana, cerca del Fuerte Argentino" [mountains or promontories in Sierra de la Ventana, near Fuerte Argentino], i.e., 19 km west of Tornquist City (38°05'S–62°13'W), on the road joining the National routes 35 and 33, on the banks of the Sauce Chico stream.

Diagnosis. Protoconch with waved axial ribs crossed by spiral lines. Penis retractor muscle inserted in the distal end of a short flagellum. Epiphallus long and cylindrical with a distal widening indicating the presence of an internal epiphallic gland. Internal wall of the penis with three areas of different sculpture. Internal wall of the vagina smooth. Middle portion of the bursa copulatrix duct distinctly enlarged, with an internal sculpture of lengthy longitudinal lamellae in the wide region proximal to the bursa copulatrix, and a thick wall with perpendicular zig-zag grooves in the distal one.

Redescription. Shell (Figs 1–10). Elongate-ovate, glossy, tawny to brown in color, rather thin; sometimes with some dark brown bands irregularly spread, and marked growth lines; 6 to 7.5 moderately convex whorls with shallow but well defined sutures.

Elongate-ovate aperture occupying ⅓ of the total shell length and lacking any fold or lamella (Fig. 1). Peristome slightly expanded and reflected (Figs 1, 2); inner lip turning on the columellar region although with a sharp edge. Parietal callus thin but well-defined. Columellar axis slightly inclined rightwards. Umbilicus narrow (Fig. 2).

Protoconch (Fig. 3) with a finely costulated surface, with marked waved axial ribs that often branch, crossed by a weaker spiral striation. Protoconch of adult snails smooth as a result of erosion (Figs 2, 4, 8). Protoconch-teleoconch boundary well-defined (Figs 3, 8). Teleoconch with wrinkle-like growth lines (Figs 1, 2, 8–10).

Shell measurements (in mm): SL: 21.85 ± 1.76 (0.080) [18.33–26.07]; SW: 7.86 ± 0.61 (0.078) [6.55–9.05]; LWL: 14.13 ± 0.92 (0.065) [12.26–16.07]; AL: 8.60 ± 0.78 (0.091) [6.90–10.36]; AW: 5.01 ± 0.45 (0.091) [3.90–6.00]; MA: 132.07 ± 3.19 (0.024) [125–138]; SA: 31.07 ± 2.76 (0.089) [26–39].

Cephalopodium (Figs 2, 11). Greenish brown. Head shorter than the tail, which does not surpass the length of the spire. Optic tentacles about four times longer than fore tentacles. Buccal opening large, round, with a pair of well-developed rounded lobes or lower lip appendices, which do not extend over the mandible (Fig. 11). Upper lip conspicuous but lacking a third buccal lobe or upper lip appendix.

Digestive system (Figs 12–15). Buccal mass spheroidal. Mandible arquated (Fig. 12), formed by 12 imbricated plates directed towards the central zone. Central plates rectangular, more or less narrow, of variable width; lateral plates from rect-

Figure 1. Shell morphology of *Ventania avellanedae*: general view showing shell variability and teleoconch striation. Scale bar: 5 mm.

Figure 2. Living specimen of *Ventania avellanedae* showing erosion in adult shells, umbilicus and peristome slightly reflexed.

angular to triangular, of uniform size; the more external plates are much larger, almost twice as long as the central ones. The surface of the plates is smooth; their borders are projected outwards, generating an irregular outline.

Radular teeth transversally arranged on a straight line (Fig. 13). Central tooth tricuspid and smaller than the lateral ones (Fig. 14); central cusp or mesocone of the central tooth romboid, with a free border that usually reach the basal part of the tooth; lateral cusps or ectocones much shorter than the central one. Lateral teeth bicuspid, with a long mesocone and a small ectocone located in an opposite position to the central tooth (Fig. 14). Marginal teeth bicuspid, with a thin sharpen mesocone and a smaller ectocone, similar each other; inserted between the normal bicuspid teeth, some teeth have a bifurcated ectocone giving the tooth a tricuspid aspect (Fig. 15). The form of the teeth gradually varies towards the radula edges, the cusps becoming less definite. Despite the gradualness of the transition from lateral to marginal teeth, they are usually distinguishable because marginal teeth are more elongated, have a more developed free grasping edge and slender mesocones.

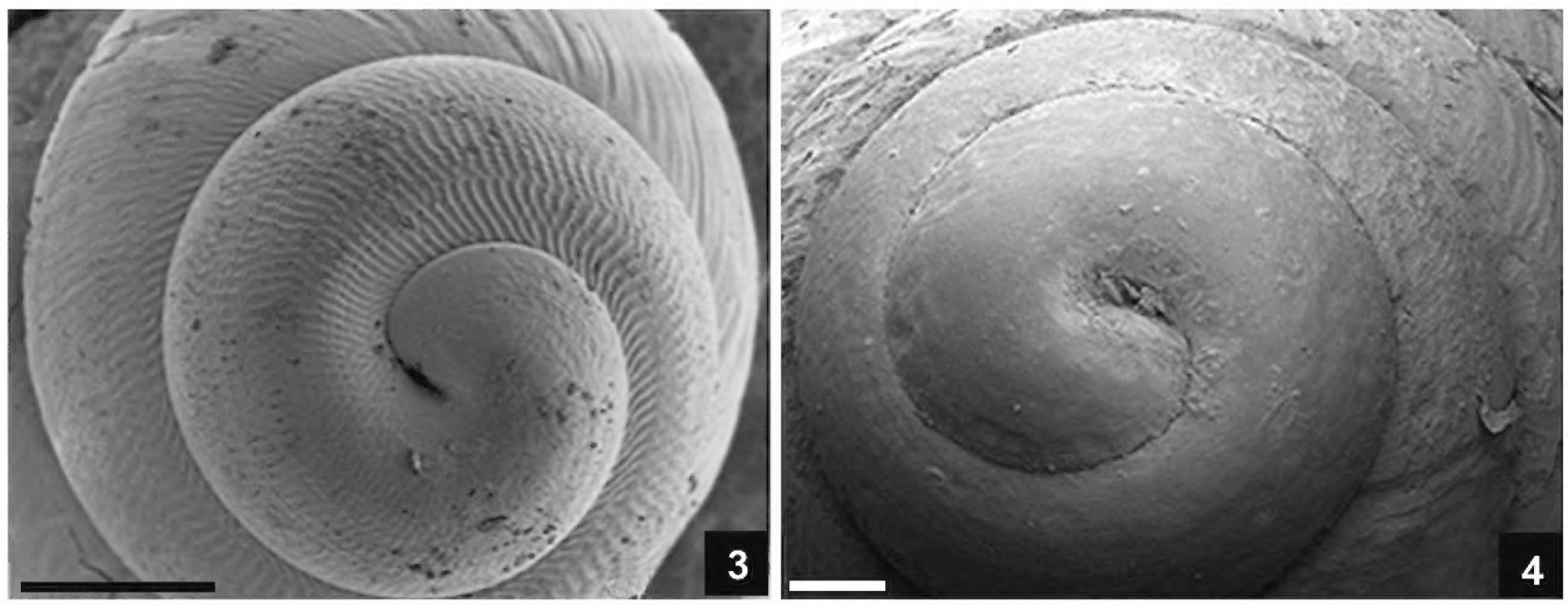
Pallial complex (Fig. 16). Narrow and elongated, 18.55 mm long on average (16.40–22.45) including the mantle collar, extends along about one and a half whorl, i.e. roughly ¼ of the total length of the snail body. The pinkish triangular kidney occupies ¼ to ⅓ of the lung length. Internal structure of the kidney with longitudinal, ondulated lamellae, in close contact among them. On the upper zone of the kidney, lamellae are widened and more globose; however they do not demarcate different regions, as their inner structure is homogeneous.

The primary ureter runs along the rectal side of the kidney up to the top of the lung cavity; it then turns down along the rectum and forms the secondary ureter, which opens proximally in the ureteric pore at the level of the middle point of the kidney. From this point on, the secondary ureter is open and ends at the pneumostome.

The pericardium, located in the upper columellar side of the pallial system, is 1.75–2.55 mm long. It is continuous with the prominent pulmonary vein that runs parallel to the rectum and reaches the mantle collar. The afferent marginal vein branches out approximately from the distal third of the pulmonary vein, equalling about 45% of its length. Adrectal area between the rectum and the pulmonary vein and between the pulmonary vein and the marginal afferent vein with a moderate vascularization. A marginal vein of weak development branches out from the last portion of the pulmonary vein and runs along the mantle collar border. The interramus area is deeply excavated and of variable shape, either triangular or rectangular. The mantle collar includes a whitish spongy pallial gland.

Genital system (Figs 17–20). Ovotestis composed by groups of acini extending over the inner, excavated face of the third whorl of the digestive gland. Collecting channels going out the ovotestis lead into the hermaphrodite duct, a twisted duct with a swollen central portion forming the vesicula seminalis. It ends at the white fertilization pouch-spermathecal complex composed by a proximal swollen portion and a thin, long blind sac (Figs 17, 20). This complex is visible on the basal side of the albumen gland. The hyaline-yellow albumen gland is elongated, folded over its basis, and lies against the fore concave surface of the digestive gland over the digestive pouch.

Spermoviduct long and very curvilineal formed by the twisted, hyaline orange uterus, ending at the free oviduct and the white and glandular prostate, and continuous with the vas deferens.



Figures 3–10. Scanning electron micrographs of the protoconch and teleoconch of *Ventania avellanedae*: (3) protoconch of a juvenile shell; (4) protoconch of an adult shell; (5–7) details of the axial and spiral sculpture of the protoconch with increasing degrees of erosion; (8–10) transition from protoconch to teleoconch, and details of the teleoconch of an adult specimen. Arrow indicates transition protoconch-teleoconch. Scale bar: 3 = 0.5 mm; 4–10 = 0.2 mm.

The bursa copulatrix is spherical, and its duct is longer than the spermoviduct, which has two portions of different diameter. The part proximal to the bursa copulatrix slightly broadens towards the transition point at the distal third, where its diameter decreases by half and slightly widens again towards the end. The inner wall presents a characteristic sculpture. The proximal wide region has lenghty longitudinal lamellae, while the distal one has a thick wall with perpendicular zig-zag grooves

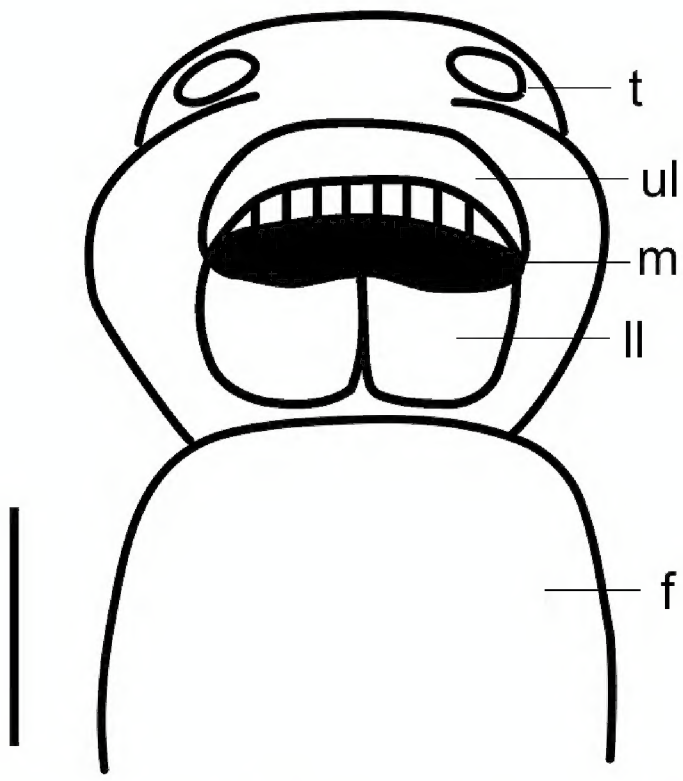
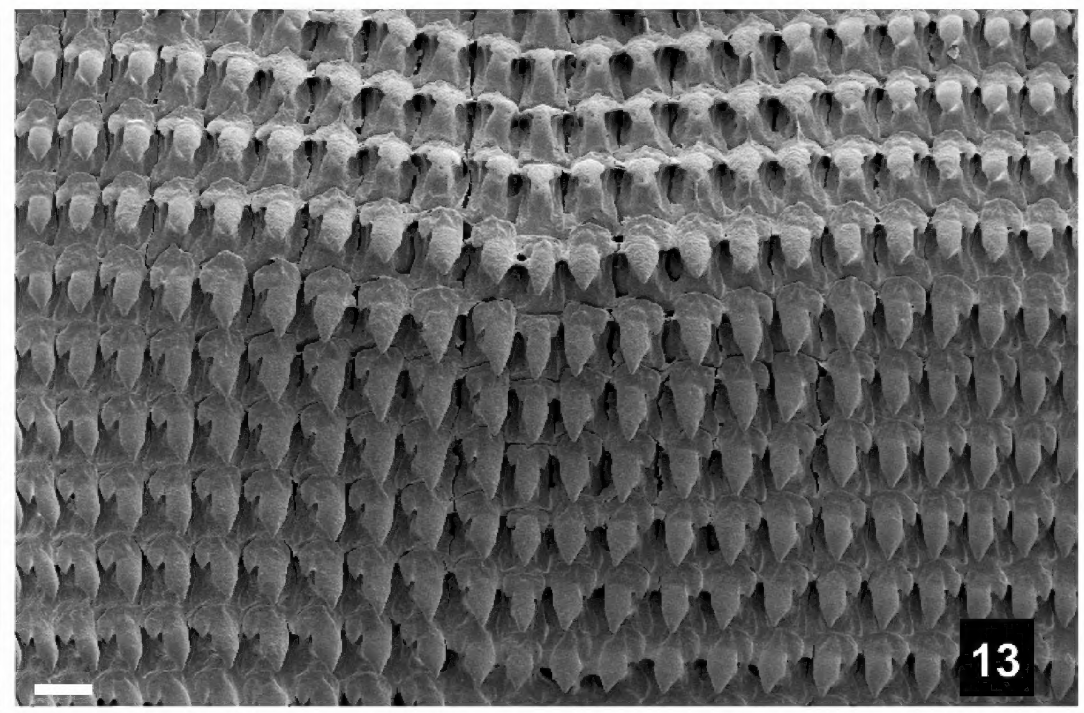


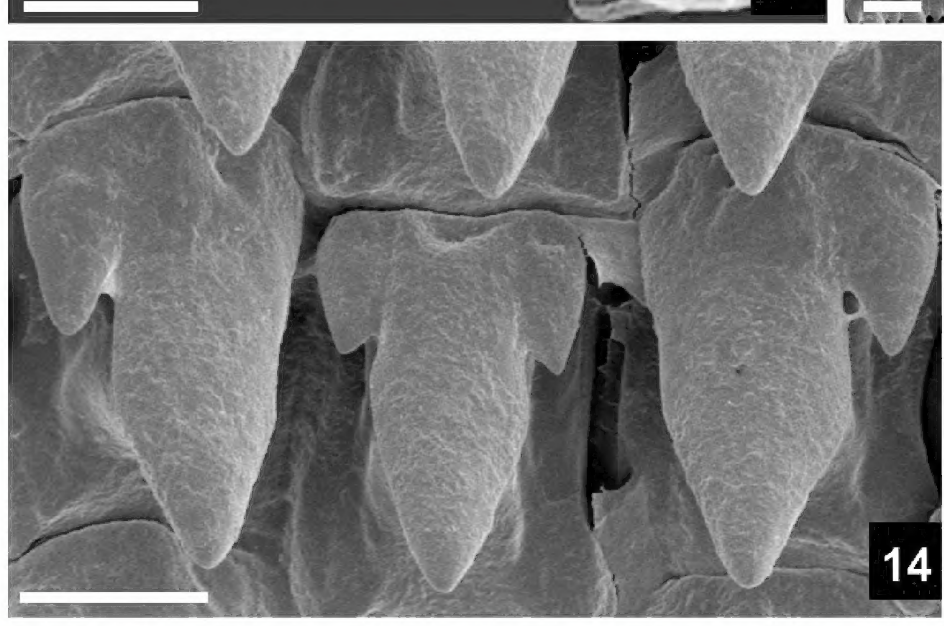
Figure 11. Buccal morphology of *Ventania avellanedae*. (f) foot, (ll) lower lip, (m) mandible, (t) tentacle, (ul) upper lip. Scale bar: 1 mm.

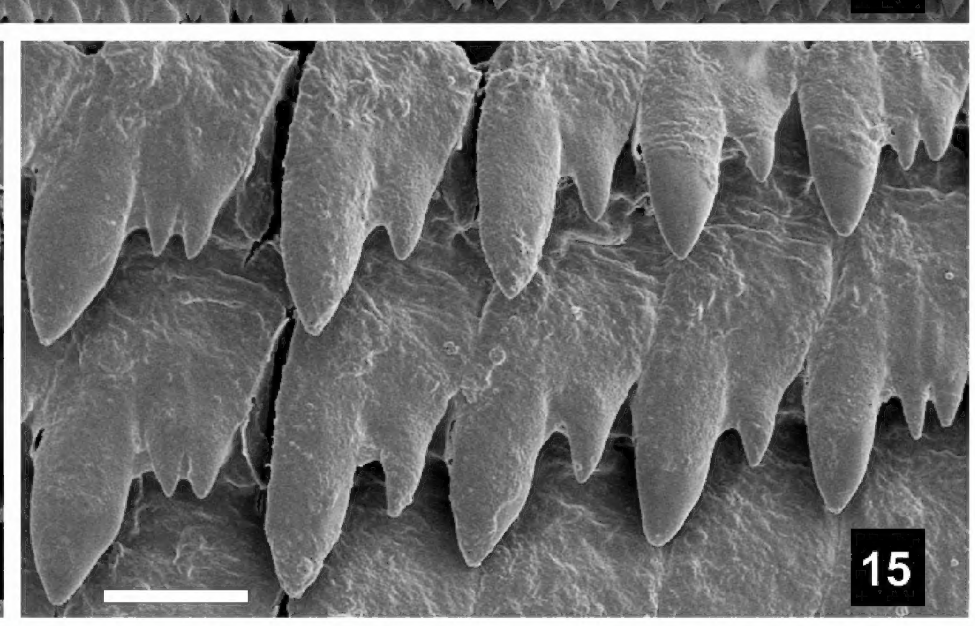
(Fig. 19). The duct of the bursa copulatrix and the free oviduct empty into the short and cylindrical vagina with spongy but smooth inner wall.

The vas deferens is a tubule of constant diameter that emerges just above the bifurcation of the vagina to the free oviduct and the bursa copulatrix duct. It runs attached to the vagina and the penial complex surface, passing underneath the penis sheath, and finally gets into the epiphallus–flagellum boundary. It is clearly visible and of thick diameter.

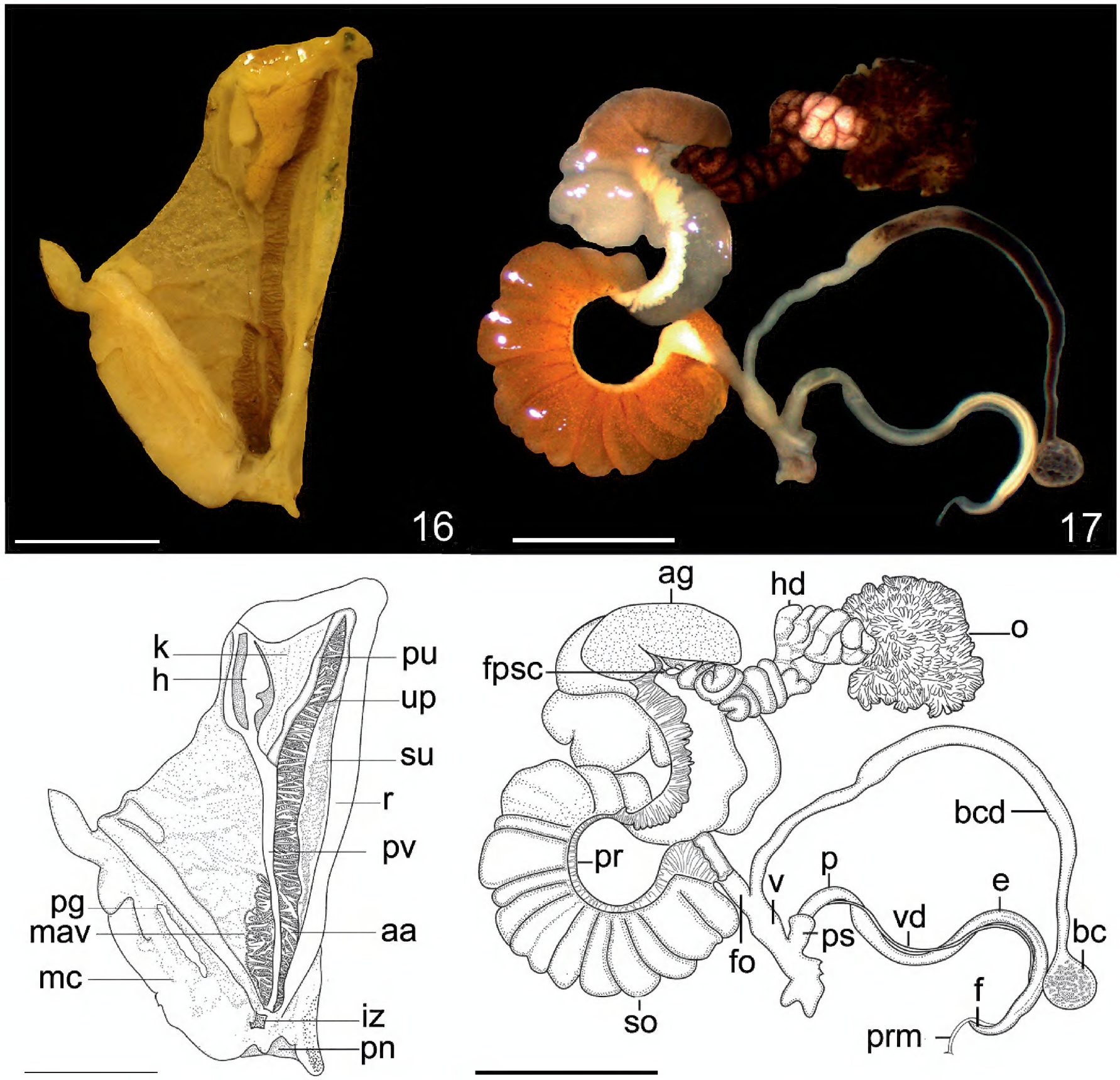
The male terminal genitalia or phallic complex is composed by a well delimited flagellum, epiphallus and penis. Flagellum, short and thin, occupies 1⁄9 of the phallic complex; the small and thin retractor muscle inserts on its distal end (Fig. 17). The limit between flagellum and epiphallus is marked by the calibre shift and the entering of the vas deferens. The epiphallus is longer than flagellum and penis, occupies about 2⁄3 of the phallic complex, presents a distal widening indicating the presence of an internal epiphallic gland, and its inner wall presents four well defined straight folds. The limit between epiphallus and penis is demarcated by a constriction. Penis occupies about 1⁄5–1⁄4 of the







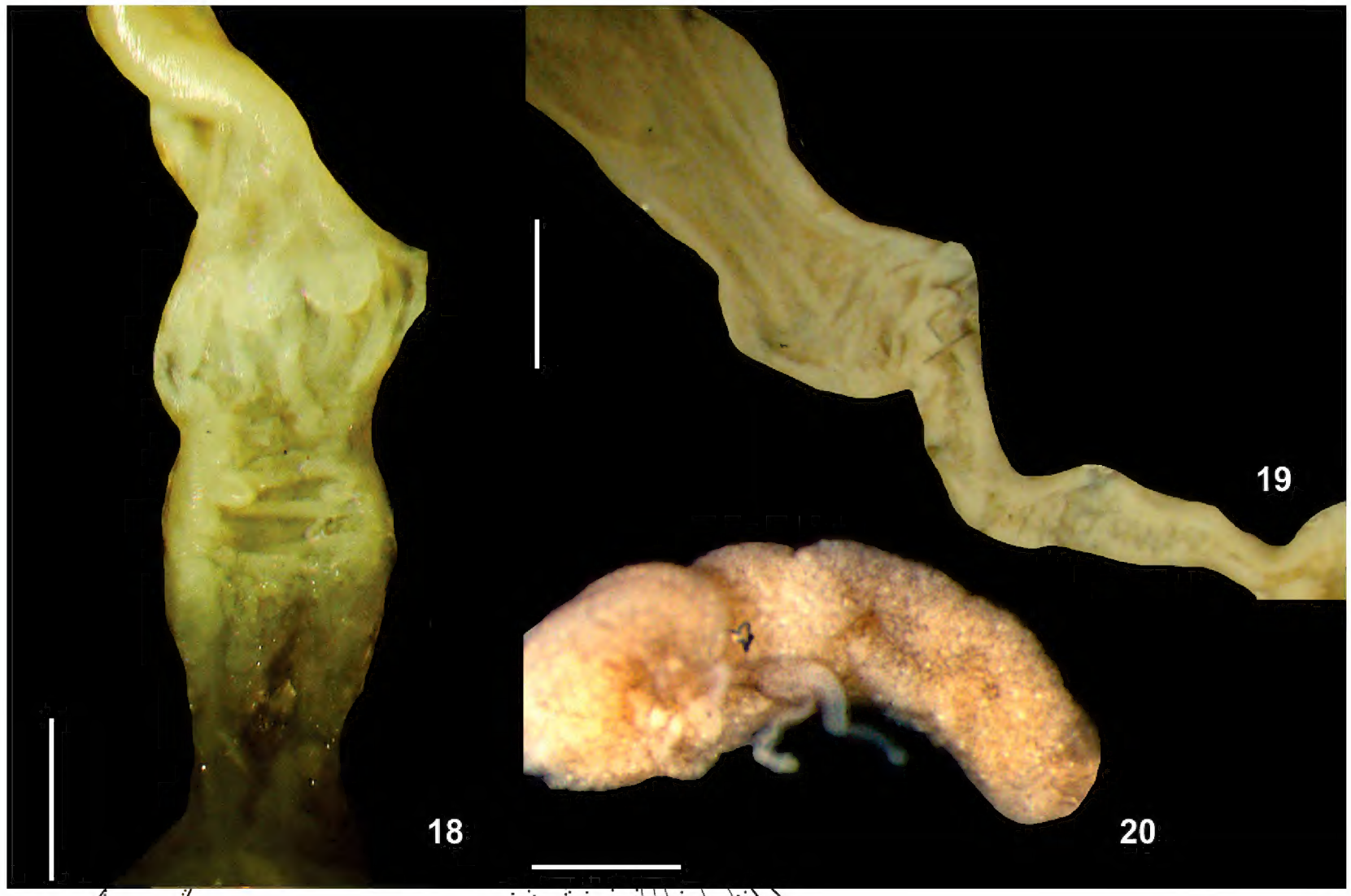
Figures 12–15. Scanning electron micrographs of the mandible and radula of *Ventania avellanedae*: (12) mandible; (13) radula; (14) central and lateral teeth; (15) marginal teeth. Scale bar: 12 = 0.20 mm, 13 = 0.02 mm; 14-15 = 0.01 mm.

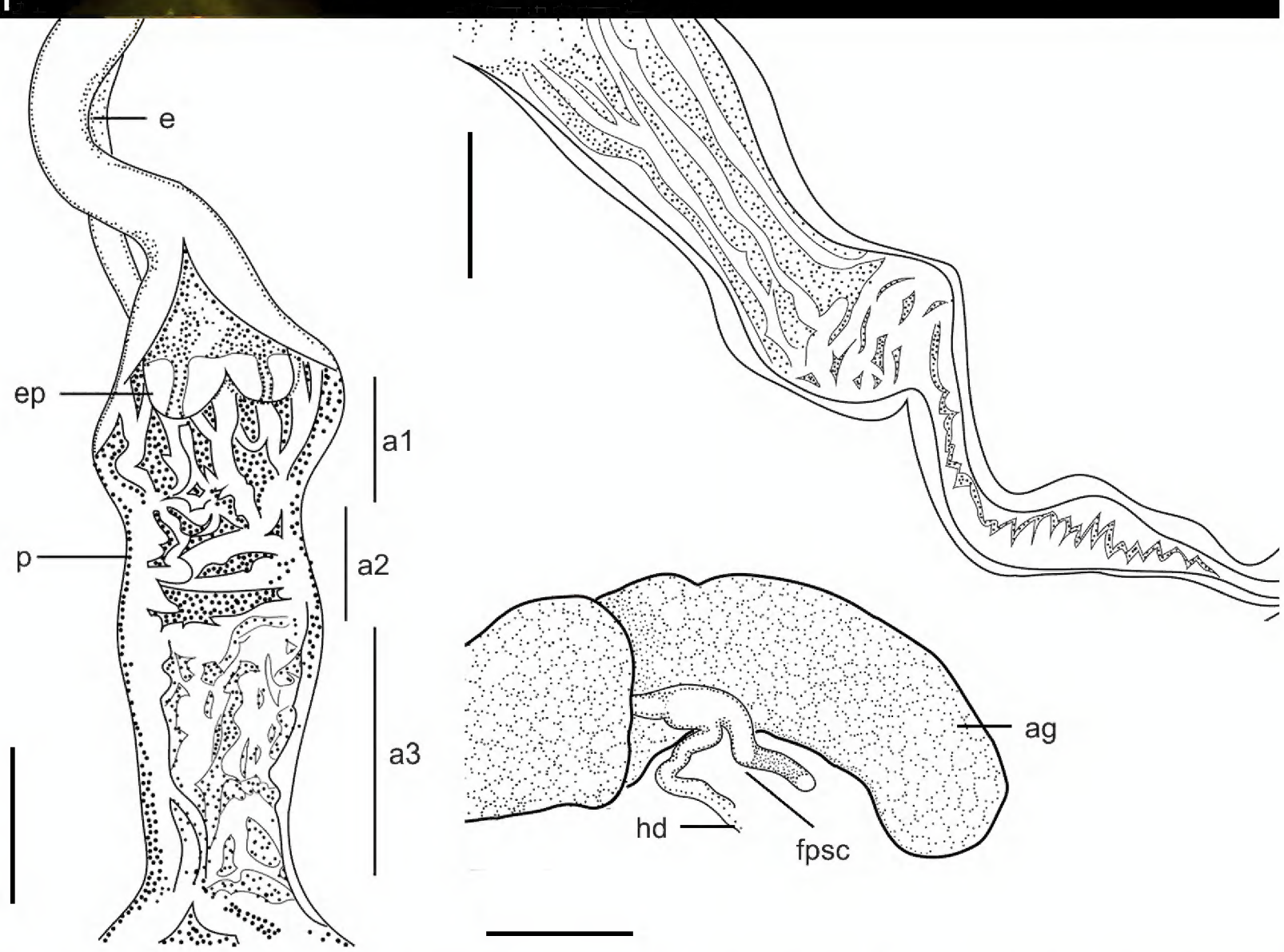


Figures 16–17. Internal anatomy of *Ventania avellanedae*: (16) pallial complex; (17) genital system. (aa) adrectal area, (ag) albumen gland, (bc) bursa copulatrix, (bcd) bursa copulatrix duct, (e) epiphallus, (f) flagellum, (fo) free oviduct, (fpsc) fertilization pouch-spermathecal complex, (h) heart, (hd) hermaphroditic duct, (iz) interramus zone, (k) kidney, (mav) marginal afferent vein, (mc) mantle collar, (o) ovotestis, (p) penis, (pg) pallial gland, (pn) pneumostome, (pr) prostate, (prm) penis retractor muscle, (ps) penial sheath, (pu) primary ureter, (pv) pulmonary vein, (r) rectum, (so) spermoviduct, (su) secondary ureter, (up) ureteric pore, (v) vagina, (vd) vas deferens. Scale bar: 5 mm.

phallic complex. It is cylindrical and relatively slender, with a strong muscular wall. A short muscular sheath surrounds its distal end (Fig. 17). Inner wall of the penis with folds and pilasters delimiting three different regions (Fig. 18): the proximal region, with longitudinal irregularly festooned pilasters and folds in the direction of penis length; the medium region, with transversal lamellae; and a distal, variable portion that has thin irregular longitudinal folds in some specimens and a spongy surface in others.

Distribution and habitat. *Ventania avellanedae* is endemic to the Ventania Mountain System, in southern Pampas, Argentina. This area was included in the biogeographic Chacoan Subregion, Pampa province by Morrone (2006). The distribution of the species is restricted to mountainous environments, mainly living in rock crevices, but it can be also found under rocks or associated to plants in rocky microhabitats (Delhey et al. 2005), so it is a rock dweller species as defined by Heller (1987).





Figures 18–20. Details of the genital system of *Ventania avellanedae*: (18) internal structure of the penis; (19) internal structure of the bursa copulatrix duct; (20) fertilization pouch–espermathecal complex. (a1) penis area 1, (a2) penis area 2, (a3) penis area 3, (ag) albumen gland. (e) epiphallus, (ep) epiphallic papilla, (fpsc) fertilization pouch-spermathecal complex, (hd) hermaphroditic duct, (p) penis. Scale bar: 1 mm.

DISCUSSION

The absence of apertural folds and lamellae, together with the scarcity of taxonomic arguments, prompted us to discuss the position of this endemic species at the family and genus levels. Odontostomidae Pilsbry & Vanatta, 1898 was formally defined mostly by having several folds and lamellae ("apertural teeth") partially occluding the aperture. Breure (1979) stated that species of Odontostomidae usually have low number of mandibular plates (less than 20) and that the ovotestis size is larger in the Bulimulidae than in the Odontostomidae. However, both characters are greatly variable and show many exceptions.

Cuezzo (2011) performed a phylogenetic analysis considering sperm ultrastructure and other morphological characters of some species of Bulimulidae and Odontostomidae. As a result, Odontostomidae, represented by *Plagiodontes daedaleus* (Deshayes, 1851), *Clessinia pagoda* Hylton Scott, 1967 and *Spixia tucumanensis* (Parodiz, 1941), is considered a monophyletic clade with some morphological apomorphies (pallial gland present; penis sheath basal, short, cuff-like; bursa copulatrix duct longer than the spermoviduct; presence of epiphallic papilla; protoconch sculptured) and some sperm apomorphies (not considered here).

Miranda (2016) presented a cladogram in the context of a phylogenetic study of genus *Bostryx* Troschel, 1847, and proposed the following discrete apomorphies for Odontostomidae (represented by *Spixia tucumanensis* and *Plagiodontes daedaleus*): presence of apertural lamellae (1), wide umbilicus (2), secondary ureter open (3), pallial gland present (4), triangular interramus area (5), vagina wider in its proximal portion (6), with inner wall with pilasters (7); bursa copulatrix duct longer than spermoviduct (8), with a middle portion approximately equal to the distal portion (9); penis sheath basal (10); vas deferens passing under the penis sheath (11) and adhered to penis retractor muscle (12); penis retractor muscle thick (13) and inserted in the flagellum in distal portion (14).

Ventania presents all the diagnostic characters proposed for Odontostomidae by Breure (1979) and Cuezzo (2011) (excluding the apertural lamellae and folds) and most of the character states hypothesized as synapomorphies of the family by Miranda (2016). Unlike as stated by Miranda (2016), *Ventania* has a narrow umbilicus, a short and cylindrical vagina with a smooth inner wall, a bursa copulatrix duct with two different areas, and the penis retractor muscle thin and the vas deferens not adhered to it. The interramus area is variable, triangular or rectangular.

Taxonomic value of the "apertural teeth" is heterogeneous among land snail families. For example, Endodontidae, Punctidae, Pupillidae, Eniidae and Camaenidae include species with and without apertural folds within a single taxon (Solem 1976, 1983, Cuezzo 2003, Nekola and Coles 2010, Gümüs and Neubert 2012); however, most Orthalicoidea having well developed apertural folds are included in a special family, usually with no information on internal anatomy. It is to be noted that some Bulimulidae and Orthalicidae (two taxa that normally lack any apertural folds) develop some columellar structures and, sometimes, also basal or parietal ones that should be equivalent to some "teeth" of the Odontostomidae, as is the case of *Drymaeus coarctatus* (Pfeiffer, 1845) or *Eudolichotis distorta* (Bruguière, 1789). On the other hand, several species of Odontostomidae are deprived of apertural folds, e.g. *Clessinia oblita* (Reeve, 1848), *C. neglecta* (Pfeiffer, 1847) and several species in *Bahiensis* Jousseaume, 1877 and *Moricandia* Pilsbry & Vanatta, 1898.

Regarding the apomorphies stated in Miranda (2016) that are absent in *Ventania avellanedae*, it is to be noted that *Cyclodontina tudiculata* and *Bahiensis punctata* also present a cylindrical vagina. The penis retractor muscle is thin and attached to the flagellum in all *Cyclodontina* and *Bahiensis* species of known anatomy. The interramus area is variable in shape in *Ventania avellanedae*. Besides, *Plagiodontes* and *Spixia* species present either triangular or rectangular interramus zones (Pizá and Cazzaniga 2009, 2010, 2012, 2016, Salas Oroño 2007, 2010).

The presence of a spongy gland, and an opened secondary ureter in the pallial complex, the penis sheath muscular and short without retractor muscle, the vas deferens passing under penis sheath, the presence of an epiphallic gland, and the duct of the bursa copulatrix longer than the spermoviduct support the hypothesis that *Ventania* should be included in the Odontostomidae.

The protoconch of *Ventania* was described as smooth (Pilsbry 1902, Parodiz 1940, 1942, Fernández and Castellanos 1973), as also did Pilsbry (1896) for *Anctus stearnsianus*, a junior synonym of *Ventania avellanedae*. However, the protoconch of young specimens of *Ventania avellanedae* is actually sculptured with waved axial ribs crossed by spiral lines, similar to that of *Plagiodontes dentatus* (cf. Pizá & Cazzaniga, 2003). Species in *Cyclodontina* and *Bahiensis* may have different protoconch sculptures; e.g., Colley (2013) mentioned that the protoconch has axial ribs in *B. guarani*; a faint punctuation in *B. punctatissimus* (Lesson, 1830); axial lines of stippling aspect in *B. ringens* (Dunker, 1847), and weak axial lines with stippling spiral lines in *C. catharinae* (Pfeiffer, 1856). Sculpture vanishing in adult shells is frequent in species living in mountain areas with high proportion of quartz stones, as it was described by Cazzaniga et al. (2005) for *Plagiodontes patagonicus* (d'Orbigny, 1835), and by Pizá et al. (2006) for *P. rocae* Doering, 1881, two Odontostomidae species sympatric to *Ventania avellanedae*.

The radula of *V. avellanedae* does not fit the description and drawings by Parodiz (1940, 1943) since the radula of the analyzed fresh specimens had bi– and tricuspid teeth, not a pentacuspid central tooth; lateral teeth were very variable, and the marginal ones were very elongated. This radula is similar to that of some species of Odontostomidae, e.g. *Cyclodontina tudiculata* (Martens, 1868) (Colley, personal communication) and *Spixia cuezzae* Salas Oroño, 2010. So, the view of Parodiz (1940, 1943) that the radula of *Ventania* should not have any generic difference with other *Odontostomus* is here reaffirmed.

The morphology of the genital system was compared with an alcohol preserved specimen of *Bahiensis guarani* (d'Orbigny, 1835) – an Odontostomidae from Brazil and northern Argentina

deprived of apertural folds –, and the available information on *B. punctatissimus*, *C. tudiculata* (Martens, 1868) and *C. rhodinostoma* (d'Orbigny, 1835) (Colley, personal communication).

Ventania is similar to *Cyclodontina* and *Bahiensis* in the shape and position of the thin penis retractor muscle, located at the distal end of the flagellum. *Ventania avellanedae* differs from *C. tudiculata* (Martens, 1868), *C. rhodinostoma* (d'Orbigny, 1835), and *B. punctatissimus* (which lacks epiphallus) by the bursa copulatrix duct shape and the distal widening of the epiphallus. It also differs from *Bahiensis guarani* (d'Orbigny, 1835) because the latter has an inner penial papilla and the inner wall of the vagina has a sculpture of longitudinal lamellae. Sculpture of the inner wall of penis and vagina is unknown in the remaining species of *Bahiensis* and *Cylclodontina*. *Ventania avellanedae* differs from the known species in *Cyclodontina* and *Bahiensis* by its penis inner wall divided in three different areas defined by different sculptures; the long and cylindrical epiphallus widening in the transition to the penis corresponding with the inner epiphallic gland, and differences in the shape and inner sculpture of the bursa copulatrix duct.

Ventania avellanedae is a rare rock dweller species restricted to rocky habitats of the Ventania Mountain System. As a strict endemic species, it deserves a high conservation priority. The distribution area of *V. avellanedae* includes the "Ernesto Tornquist" Provincial Park, a reserve protecting the natural highland grasslands in southern Pampas. However, native flora and fauna of the park is impacted by feral horses and exotic woody plants. The effects of these disturbances on natural vegetation and bird community dynamics were already studied in this area. Delhey et al. (2005) studied the effect of some environmental conditions and the impact of horses and exotic pines on the distribution and abundance of four autochthonous macrosnail species, including *V. avellanedae*. Macrosnails were absent from sites with exotic pines, but presented different responses to feral horses. *Ventania avellanedae* did not seem to be very affected by horses because the preferred resting sites are rock fissures, where the snails are somewhat safe from that impact.

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